

REMARKS

Claims 1-3 and 5-28 are in the application. Claim 19 has been amended as requested by the Examiner to correct a typographical error. Claims 1, 13, and 28 have been amended to recite that the imaging device detects an image created by photons produced incidental to the delivery of said electron treatment field. No new matter is added by this amendment. Reconsideration and examination of all claims are respectfully requested.

Pursuant to the Examiner's request, Applicants once again enclose herewith additional copies of each of the four (4) references cited in their IDS submitted upon filing. Applicants respectfully request that the Examiner consider the references and initial the PTO Form 1449 to confirm that the references have been considered.

The Examiner has rejected claims 1-3 and 5-28 under 35 U.S.C. §112, 1st ¶ as "failing to comply with the written description requirement." In particular, the Examiner asserts that "the claim(s) contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention." Further, the Examiner asserts:

The specification is silent for reciting the limitation "an imaging device which detects an image created by photons generated in the delivery of the electron treatment beam for verifying an electron treatment field created by an electron treatment beam" as recited in claims 1-3 and 5-28. Therefore, the Examiner don't understand what is the source that produces a treatment beam having electrons and photons? And How is the photons detected to verify an electron treatment field, since the photons and electrons have different characteristics? Additional explanations are needed if applicant insists on including these features in claims 1-3 and 5-28 without the insertion of new matter. (Final Office Action at pp 2-3).

Applicants respectfully traverse this ground of rejection. Embodiments allow incidental photons generated during delivery of an electron treatment beam to be imaged. The feature is described throughout the specification as filed. For example, at page 9, line 32 – page 10, line 16 the description notes that in some embodiments "detector 34 is used to verify electron treatment fields delivered by radiation therapy device 10 by detecting bremsstrahlung photons produced

incident to the generation of the electron treatment field.” That is, even where the radiation therapy device is operated to delivery an electronic treatment field, the imaging device is able to capture an image based on incidental photons generated during delivery of the electron treatment field. In some embodiments, the imaging may include processing to calculate a relationship between the incidental photons and the electron treatment beam. The result is an ability to create an image of the electron treatment field by detecting incidental photons. Among other benefits, this allows a dual mode radiation therapy device to be operated without need to switch imaging devices mid-treatment (i.e., the imaging device is capable of capturing images in both primary electron and primary photon treatment modes).

The feature objected to by the Examiner is discussed in further detail throughout the specification as filed. For example, the specification at page 9, lines 21-30 includes a discussion of test results describing the quantity of the incident photons that have been produced in some test electron beams. At page 9, lines 6-19 a discussion of one example type of imaging device that is capable of detecting the incident photons is described. At page 13, line 16 – page 14, line 15, a discussion is provided regarding how the angular dependence of the incident photons (generated incident to an electron treatment beam) may be corrected to generate an accurate image. Example images generated from the detection of incident photons produced during the delivery of an electron treatment beam are shown and discussed in conjunction with FIG. 6.

To advance the case, and to further clarify the claims, Applicants have amended claims 1, 13, and 28 to recite that the imaging device is operated to detect an image created by photons produced incidental to the delivery of the electron treatment beam. No new matter is added by this clarifying amendment.

Applicants respectfully suggest that the claims are in compliance with the requirements of 35 U.S.C. §112. Answers to each of the Examiner’s questions regarding the claim limitation are found directly in the specification as filed. Applicants respectfully request that the rejection under 35 U.S.C. §112 be withdrawn.

The Examiner has again rejected claims 1-3 and 5-28 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,396,889 (“Ueda et al.”). The Examiner has not responded to any of Applicants arguments regarding the Ueda reference. Applicants respectfully request that the Examiner provide some response to Applicants arguments. Applicants reiterate herein their traversal of the Ueda reference.

As discussed in their prior response, Applicants respectfully assert that the Ueda reference fails to teach or suggest embodiments of the present invention at least because Ueda fails to teach or suggest a method of verifying an electron treatment field created by an electron treatment beam. Ueda describes a conventional radiation therapy system that uses a primary photon treatment beam. A primary photon treatment beam is not the same as a primary electron treatment beam, and has substantially different characteristics. One of the different characteristics is that a primary electron treatment beam does not pass through a patient's body, providing desirable treatment characteristics, but also making it difficult to obtain portal images. Applicants' invention is directed to solving these difficulties.

Because Ueda fails to teach or suggest a method of verifying an electron treatment field created by an electron treatment beam, Ueda fails to anticipate embodiments of the present invention as recited in claim 1. Further, Applicants respectfully assert that it would not have been obvious, at the time of Applicants' invention, to modify Ueda to arrive at the invention of claim 1. As discussed in Applicants' background section, there are substantial differences between imaging of primary photons and imaging of primary electrons, and Ueda provides no disclosure of the desirability of such imaging of a primary electron beam. Claim 1, at least as amended, is patentable over the Ueda reference.

Dependent claims 2-3, and 5-12 are believed patentable at least as depending from a patentable base claim. Further, each of the other independent claim sets (including claims 13, 19, 25 and 28, and their respective dependent claims) are believed patentable for similar reasons.

Other claims recite further features that are not taught or suggested by the Ueda reference. For example, the Ueda reference fails to teach or suggest enhancing the image to generate a representation of the electron treatment field as recited in claim 2, at least because Ueda does not describe delivery of an electron treatment field (but rather describes delivery of a photon treatment field). Further, there is simply no teaching or suggestion anywhere in Ueda that a captured image of any type is enhanced. Enhancement allows some embodiments to perform imaging on electron treatment fields that have relatively low amounts of bremsstrahlung photons. At most, Ueda describes comparing two images to identify positional displacement; there is simply no teaching or suggestion of any image enhancement in Ueda. As such, claim 2 (and, similarly, claims 9-12, 14, 16-17, and 25-27) is believed further patentable over Ueda for this reason.

Other claims recite further features of the enhancement. For example, claim 8 relates to embodiments where image enhancement includes determining an energy of the electron treatment beam, calculating an angular dependence of photons on the beam, and generating a representation of the field based on the detected image and the calculated angular dependence. In this manner, low amounts of bremsstrahlung photons can be detected and used to create a detailed image. There is simply no teaching or suggestion in Ueda to perform any such image enhancement. Claim 8 is believed patentable over Ueda for this additional reason. Further image enhancement techniques are recited in claims 9-12 and each is believed patentable over Ueda. Claims 17 and 23 are believed patentable for similar reasons.

Still other claims (such as claims 18 and 24) recite the generation of an open field image and a detected image to produce a representation of an electron treatment field (a feature not taught or suggested by Ueda).

Applicants respectfully assert that the Ueda reference fails to anticipate or render obvious claims 1-3 or 5-24, and, as such, request that the rejection over the Ueda reference be withdrawn.

C O N C L U S I O N

Accordingly, Applicants respectfully request allowance of the pending claims. If any issues remain, or if the Examiner has any further suggestions for expediting allowance of the present application, the Examiner is kindly invited to contact the undersigned via telephone at (650) 694-5810.

Respectfully submitted,

6/7/04

Date



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encl. Four (4) References Cited In Prior ID